

系所組別： 生物資訊與訊息傳遞研究所甲組

考試科目： 生物化學

考試日期：0220，節次：2

※ 考生請注意：本試題 可 不可 使用計算機**A. Choose the correct answer (only one answer) for each of the question (單選題) (30%)**

1. Which of the following sugars can be classified as ketone?

- (A) Fructose
- (B) Mannose
- (C) Galactose
- (D) Erythrose

2. The coenzyme required in the transamination reaction is

- (A) pyridoxal-5'-P
- (B) thiamine pyrophosphate
- (C) ferredoxin
- (D) biotin

3. What is the source of the nitrogen atom in urea?

- (A) Lysine
- (B) Aspartate
- (C) Cytosolic carbamoyl phosphate
- (D) α -Keto acid

4. A deficiency of the following enzyme can lead to phenylketonuria

- (A) Tyrosinase
- (B) Creatine synthase
- (C) Phenylalanine hydroxylase
- (D) Cystathionine lyase

5. Which of following amino acids can be the precursor of heme in human hemoglobin?

- (A) Glutamate
- (B) Glycine
- (C) Tryptophan
- (D) Lysine

6. Which of following descriptions is TRUE?

- (A) Lecithin is phosphatidylinositol.
- (B) Testosterone is a sphingolipid.
- (C) Triacylglycerol is an amphipathic molecule.
- (D) Many lipids contain fatty acids in ester or amide linkage.

7. The reducing equivalent required for lipogenesis is

- (A) FAD
- (B) NADH
- (C) FADH₂
- (D) NADPH

(背面仍有題目,請繼續作答)

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8. Prostaglandins are derivatives of

- (A) estrone
- (B) cholesterol
- (C) arachidonic acid
- (D) mevalonate

9. The essential enzyme activity of telomerase is

- (A) ligase
- (B) DNA polymerase gamma
- (C) endonuclease
- (D) reverse Transcriptase

10. Shine-Dalgarno sequence is located within

- (A) mRNA
- (B) tRNA
- (C) rRNA
- (D) miRNA

11. Which of the following hormones can cross the cell membrane and then binding to a receptor?

- (A) Norepinephrine
- (B) Glucagon
- (C) Estradiol
- (D) Insulin

12. Diacylglycerol activates which of the following enzyme?

- (A) Protein kinase A
- (B) MAP kinase
- (C) Lipase
- (D) Protein kinase C

13. All of the following biochemistry pathways occur in the mitochondria of mammalian cells EXCEPT..

- (A) fatty acid biosynthesis
- (B) DNA synthesis
- (C) beta oxidation of fatty acids
- (D) protein synthesis

14. The rate-limiting step of fatty acid synthesis is catalyzed by

- (A) malic enzyme
- (B) acetyl CoA carboxylase
- (C) pyruvate dehydrogenase
- (D) ketoacyl reductase

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15. In cells, which of the following factors is important in reverse transcription?

- (A) rRNA
- (B) oligo dT
- (C) tRNA
- (D) miRNA

B. Choose appropriate answers for each question (複選題) (30%)

1. Which of the following is not a heteropolysaccharide?

- (A) Glycogen
- (B) Cellulose
- (C) Chitin
- (D) Chondroitin

2. Which of the following descriptions are **TRUE**?

- (A) Galactose utilization involves biotransformation of G-6-P.
- (B) Hexokinase, glucose-6-phosphate isomerase, fructose-6-phosphatase can convert glucose into fructose.
- (C) In fructose catabolism, fructose can be phosphorylated into fructose-1-phosphate.
- (D) In glycolysis, fructose 1,6-bisphosphate is a substrate of the reaction of carbon-carbon bond cleavage.

3. Which of the following descriptions are **TRUE**?

- (A) Glucose labeled with ^{14}C in C-1 and C-6 gives rise in glycolysis to pyruvate labeled in its methyl carbon
- (B) Glucose labeled with ^{14}C in C-1 and C-6 gives rise in glycolysis to pyruvate labeled in its carbonyl carbon
- (C) Cori cycle takes place between liver and peripheral tissue such as muscle.
- (D) Cori cycle involves the conversion of ammonia to urea for excretion.

4. Which of the following descriptions are **TRUE**?

- (A) Gluconeogenesis is not the direct reversal of glycolysis.
- (B) Gluconeogenesis is an energy-producing pathway overall.
- (C) In gluconeogenesis, oxaloacetate is an intermediate in the production of phosphoenolpyruvate from pyruvate.
- (D) In gluconeogenesis, malate is an intermediate in the production of phosphoenolpyruvate from pyruvate.

5. Which of the following descriptions are **FALSE**?

- (A) D-Ribose 5-phosphate and NADPH are the net products of pentose phosphate pathway.
- (B) FADH is a positive regulator in pentose phosphate pathway.
- (C) Mitochondrial electron transport passes electrons from NADH to oxygen.
- (D) NADH is the final electron acceptor in the electron transport system.

(背面仍有題目,請繼續作答)

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6. Which of the following descriptions are TRUE?

- (A) Using OD280 nm to measure protein concentration, because amino acid tryptophan can absorb UV light.
- (B) Cysteine is essential for forming the intrachain disulfide linkage.
- (C) Dithiothreitol (DTT) is used to break disulfide bonds.
- (D) Asparagine can form an N-glycosylation linkage with sugar.

7. Which of the following descriptions are TRUE?

- (A) Size is the property of protein for gel filtration purification.
- (B) The separation of basis in IEF is pI, not MW.
- (C) Mass analyzer separates ions based on its mass-to-charge ratio (m/z)
- (D) Protein M.W. is a major factor for separation in SDS-PAGE.

8. Which of following protein involves in splicing of introns in nuclear mRNA primary transcript?

- (A) CTD of RNA polymerase II
- (B) Primase
- (C) Endonuclease
- (D) RNA helicase

9. Which of the following factors are required for eukaryotic DNA transcription?

- (A) DNA polymerase
- (B) DNA ligase
- (C) RNA polymerase
- (D) General transcription factors

10. Which of the following posttranslational modification can be observed on histone?

- (A) Acetylation
- (B) Phosphorylation
- (C) Methylation
- (D) Sumoylation

C. Explain the following biological terms and their purposes or function (40%):

1. Feedback inhibition (2 points)
2. cDNA (2 points)
3. High-performance liquid chromatography (HPLC) (2 points)
4. Two-dimensional electrophoresis (2 points)
5. Allosteric enzyme (3 points)
6. Operon (3 points)
7. Restriction enzyme (3 points)
8. DNA chip (3 points)
9. Signal transduction (4 points)

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10. Post-transcriptional modification (4 points)
11. Transcriptome (4 points)
12. Proteomic (4 points)
13. Systems biology (in a bioinformatics view) (4 points)